proper terminating network. With this approach no unnecessary call routing takes place. Also, for interLATA calls, the IXC can establish a direct relationship with the terminating network to which they deliver calls to ported numbers. This approach also minimizes the number of database queries required to deliver calls as the query occurs where a decision must be made in the call routing path.

In addition to the architectural issue, the query-response and resulting call routing approach has a significant impact on the ability of the solution to support features and services. The current network and its attendant services and features are based on a single unique number which is used for both customer dialing and network routing. Any solution which can use a single number for both these functions is more likely to be transparent in terms of feature and service capabilities which it would support.

Of course, it is only through detailed engineering and live testing that the notions can be verified. MCImetro has, along with its multi-vendor task force which includes Siemens Stromberg-Carlson, Nortel, DSC and Tandem performed precisely these detailed engineering analyses and live testing in the development of a True LNP solution. This solution is discussed in Section 5 below.

SECTION 5. CARRIER PORTABILITY CODE (CPC): A "TRUE" LNP SOLUTION

MCImetro sought in late 1994 and early 1995 to develop a True LNP solution which would accomplish the following:

1. The solution was to work within an N-1 architectural model;
2. The solution was to work within the confines of current standards;
3. The solution was to impose minimal impact on all network providers;
4. The solution was to make use of current network and switch capabilities, to the greatest extent possible;
5. The solution was to support as many features, capabilities, and services as possible and have minimal impact on other features; and
6. The solution was to be transparent to the end user who ports their number and on those end users that do not port their number.

The CPC model accomplishes all of these objectives. An explanation of how the CPC model works is provided in this section. The CPC solution allows Local Number Portability to be deployed in pockets, or portability "islands", without requiring extensive changes to the existing network architecture or to switch software. By utilizing existing TCAP 800 Intelligent Network (IN), or in the alternative Advanced Intelligent Network Release 0.1 (AIN 0.1)

protocols and triggers, the CPC model facilitates a smooth introduction into local serving areas and precludes many of the problems faced by other LNP concepts which use other architectural approaches, such as Originating Network queries or two number solutions.

Specifically, the CPC model offers the following advantages and benefits:

1. It has been proven in prototype testing across four switch types (DMS-100, DMS-250, DEX 600 EWSD switch);
2. It offers complete transparency to all subscribers;
3. It uses existing IN/AIN 0.1 protocols;
4. It supports IN architecture with minimal software changes to switch nodes;
5. It takes advantage of inherent central office routing capabilities;
6. It supports both Multi-Frequency (MF) and Signaling System 7 (SS7) trunk signaling protocols;
7. It transparently supports widely deployed subscriber features (e.g., Call Forwarding, Calling Number Delivery, Customer Originated Trace, etc.); and
8. It supports Non-LNP capable offices.

Specifically, the CPC LNP model is an IN/AIN-based solution that uses a Local Number Portability database (SCP) to obtain the routing information necessary to terminate calls to subscribers who have changed Local Service Providers. Each Local Service Provider will be assigned a unique three digit Carrier Portability Code

(CPC) within an LNP portability island or area. This CPC is stored with the Directory Number of the subscriber in the LNP database, and is inserted in place of the NPA (Numbers Plan Area) in the database response so the network can use existing routing mechanisms to route the call the proper terminating network.

When a call is originated to a ported subscriber, the originating end office (or an LNP-capable end office) will launch a TCAP 800 IN or AIN 0.1 query to the database to retrieve the subscriber's CPC. The LNP database responds with the CPC + the last seven digits of the Directory Number of the ported subscriber. The call will then be routed using existing six-digit translations based on the CPC and the dialed office code (CPC + NXX). The CPC is used only to route the call and is completely transparent to the subscriber.

When a non-ported number is received in an LNP query, the database will simply respond by sending back the ten digits that were sent in the query to signify that the call is to be routed to the Local Service Provider to which the NXX is assigned by using existing six digit routing functionality.

The CPC approach maximizes the use of existing protocols, using either the TCAP 800 IN (TRY-TRY-000533) or AIN 0.1 (TRY-NOT-001284 and TR-NWT-001285) protocols to query the SCP for a translation of the dialed number (NPA-NXX-XXXX) to the routing number (CPC-NXX-XXXX). This reliance on two alternative existing technologies offers unparalleled implementation flexibility and enhances the robustness of the solution. Furthermore, no changes

are required to the TCAP 800 IN or AIN 0.1 protocols to query the database, and only minimal changes to call processing software that triggers the TCAP 800 queries.

Using the CPC model, an LNP database query will only be required when a dialed intraLATA number is not in the originating end officeÆs database, and the NPA-NXX is marked in the originating end officeÆs routing translations as being "portable". By minimizing the number of LNP database queries, significant cost and performance advantages are possible.

The CPC can be any three digits between 200-999, with the exception of Service Access Codes (eg, 800, 900, etc.), N11s, and valid or reserved NPA codes. The CPC need only be unique within the LATA, or portability island, because it is never delivered to an IXC by the originating Local Service Provider.

Since the CPC is in the same format as the NPA, it can be accommodated by either MF or SS7 signaling protocols. This feature of the design offers significant cost advantages in that existing direct MF routes between non-SS7 capable and SS7-equipped offices can be maintained, and MF overflow trunk groups between end offices can continue to be used. Calls incoming from non-LNP capable switches are handled by utilizing existing local tandem end office functionality, which treats the call as a local origination at the tandem itself, which then initiates the database query/response and resultant call routing functions.

The CPC approach has been successfully tested to demonstrate that features, such CLASS services, continue to work within this

environment. This is attributable to the fact that CPC is a one number solution. Since it works based upon the N-1 architecture, unnecessary call routing is eliminated. In addition, negative impacts of incumbent networks being involved in ported calls are avoided since the incumbent is not in the call path.

It is acknowledged that improvements to the CPC model may be possible. However, it appears that the model is superior to any alternative under consideration, including both interim proposals and alternative database proposals.

The industry is evaluating various approaches in numerous arenas. Section 6 provides some detail about the various activities that are underway.

SECTION 6. INDUSTRY ACTIVITIES AND EXPECTATIONS

Several state regulatory agencies and the FCC are in the process of considering True LNP. The results of these activities will progress in very different ways.

At the FCC, a Notice of Proposed Rulemaking (95-116) was released in August. The schedule calls for comments and reply comments in the September and October timeframe. It should be noted the NPRM process could take a considerable amount of time.

The New York PSC is currently in front on the issue of True LNP. An industry task force has selected the MCImetro CPC solution to be trialed in Manhattan. A second solution which is a two number approach will be trialed in Rochester. The trial is

scheduled to begin in early 1996 and proceed for six months. This trial provides an excellent opportunity to compare and contrast the CPC one number solution with the two number solution. An assessment of trial results will be available in mid-1996 or shortly thereafter.

In Illinois, Maryland and California, industry task forces are evaluating all of the alternative proposals which have been offered in the New York process as well as Ameritech's RFP process. In addition, several evolving proposals will be assessed. The evaluation process in both places are intended to result in a single best solution which could be adopted, trialed, and ultimately deployed as operational solutions. Work in these states will proceed for much of 1995 before any conclusions may be derived.

Georgia, Kansas and Florida have all undertaken work on the LNP issue. Work is just underway and will likely follow the approach of the Illinois, Maryland and California efforts.

Finally, USIntelco, ELI, and Stratus are currently trialing their proposal in the state of Washington. This trial is taking place on the initiative of ELI and its partners. A proceeding is now underway in which the MCImetro position is to evaluate the results of the ELI trial along with those from New York, other trials and materials on other proposals to lead to selection of a True LNP approach that meets the needs of the parties in Washington.

While there appears to be several unrelated activities taking place on LNP, it is important to recognize that many of the same parties are participating in all or most of these activities. Consequently, the marketplace will likely drive all of these activities to similar conclusions. The result will be selection of solutions which are either identical or, at least consistent with each other.

Finally, the industry forum process appears to be headed for providing a compilation of the alternative approaches. There will be little chance of industry agreement on recommending a singular, best solution for providing true LNP. However, some agreement may be reached on high level principles, etc.

SECTION 7. RELATED ISSUES

There are several issues which are legitimate to varying extents, but which are frequently used to confuse the discussion of True LNP and make True LNP seem more difficult to obtain. The issues relate to:

1. The impact of LNP on call rating, and the interaction of Geographic (location) portability and Service Provider portability relative to call rating and user billing;
2. Impacts on various Operations Support Systems;
3. Administration of the database; and
4. North American Numbering Plan (NANP) exhaust implications.

Following are brief explanations of these issues.

The issue of call rating revolves around the fact that each NXX today is associated (via a V&H coordinate) with a rate center for billing purposes. A local calling area might have a large number of NXXs, but a lesser number of rate centers. Both LECs and IXCs use these billing coordinates/rate center boundaries (rather than precise end user terminating location coordinates) for rating long distance calls. A problem arises if a Competitive Local Carrier (CLC) serves customers throughout a local calling area with a single (or 2) NXX --all it would need from a demand standpoint. When a customer switches to a new network, and although their location doesn't change, the new switch to which calls are ultimately routed has rating coordinates which may be miles away from their old switch coordinate. When their next door neighbor calls them, the neighbor may incur a toll charge since the call is routed to the distant switch rather than the old switch.

For the long term, there are several ways this issue could be addressed, but most would take more time and effort than desirable. For instance, if you were to do away with mileage sensitive billing and adopted "postalized" rates, the problem is mitigated. This has significant economic and technical appeal, but is politically very extreme and cannot be accomplished very quickly. Another alternative is to build into the database the ability to tag every phone number not just with the identity of the terminating carrier, but also the specific V&H coordinates of the customer. This would be a technically elegant solution, but would require significant

standards development, time and cost. A third solution is to have all NXXs "pooled" for number assignment purposes, where each NXX would be associated with a current rate center. Under this scheme, no carrier would have explicit assignment of NXXs, but instead would get individual numbers assigned based on the location of the customer.

In the short term, i.e., pre-True portability, the issue is more problematical. A potential solution is to have every CLC get separate NXXs assigned for each incumbent wire center. This could be a large number in a large metro area, and several potential significant issues arise: 1) can CLC switches handle the resulting large number of NXXs; and 2) are there enough NXXs.

Additionally, if CLCs do not/cannot match incumbent LEC wire centers, then there will be a problem in transitioning the wide-area NXXs of the CLCs into a database pool that separately assigns numbers by wire center.

This issue is exacerbated when the impact of geographic portability is added to the equation. Although most parties agree to work towards implementing provider portability first because it is more critical to competition and can be accomplished sooner, geographic portability is widely regarded as an enhancement to provider portability that should be pursued as quickly after provider portability as possible. However, with geographic portability the issue of rate center based billing as we know it today becomes more difficult. Once the linkage between where a ten digit line number is assigned and where the customer may be located

is broken, relevant rating information is lost.

It is apparent that, in the near term, a regulatory "fix" for this problem is required. One such fix is to treat calls which are ported as if they were still delivered to the switch where the NXX is assigned. In addition, geographic portability could be limited to the current boundaries within which lines can be ported today, or possibly within agreed to portability areas so that calls to these numbers would be rated as if delivered to the switch where the NXX is assigned today.

The second related issue is that of portability impacts on Operations Support Systems (OSS). This issue is not as complex as the rating issue above. Simply, current OSSs have been developed based upon the fact that NXXs are assigned to specific points in the network, and that the dialed number is the same as the network routing number. Once the linkage between the number and its point of termination in terms of network nodes and/or provider networks is broken, difficulty will arise in using these OSSs for their intended purposes. A single number solution, such as the MCImetro CPC appears to mitigate some of the problems which would occur in a two number approach. However, all networks will be required to adjust the way they perform Operational Support functions in either case.

The third issue is that of the administrator of the portability database. The questions relevant to this issue is who will it be, how will they be chosen, what protections can be built into the administrative systems to provide a level playing field

for all participants, and how will this function be funded. The 800 Database offers some guidance in this regard. However, the 800 Database was a LEC access service, so they played a more controlling role in addressing the issues which arose. The case of LNP is considerably different since it should not be viewed as an access service. One issue is clear, the database administrator, no matter how selected or paid or what functions it fulfills, should be an independent third party.

The fourth related issue is that of NANP exhaust implications. Most of the approaches offered to-date use two numbers. One number is dialed by the calling party and then the database translates that number to a second number for the network to use in routing the call. The CPC approach, as a single number solution uses one number for both purposes. Therefore, the potential drain of a two number solution is avoided.

A second aspect of LNP and its potential effect on NANP exhaust is that the CPC approach to LNP, and to a lesser degree two number approaches, will permit the pooling of numbers. That is to say, an NXX may be assigned to an area where multiple LSPs provide service, and all of these LSPs can draw from the same NXX. This eliminates the need for an entire NXX to be dedicated to a single LSP, which could accelerate the exhaust of NPAs.

Consequently, LNP clearly has an impact on number utilization and NANP exhaust.

SECTION 8. CONCLUSIONS

In conclusion, regulators, legislators, and other decision makers should find that the interim proposals of incumbents to provide LNP are technically deficient and are not competitively neutral. MCImetro and its partners have developed a technically feasible approach to providing True LNP in the relatively near-term so decisions regarding implementation of True LNP are not dependent on any technical consideration of the issue. The CPC solution adequately addresses the essential elements of an acceptable True LNP solution as detailed above and does so today. It operates within the N-1 architecture model and makes maximum use of current network capabilities. The related issues noted herein can be disposed of relatively quickly if the incumbent is provided the proper incentives to find solutions.

True LNP can be a reality in today's telecommunications network within a year if the decision makers order its deployment and ensure the incumbents work diligently to accomplish this objective.